

ENGINEERING DOCUMENTATION AND DATA CONTROL

by

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Mississippi Space Services (MSS), the facility services contractor for NASA's John C. Stennis Space Center (SSC), is utilizing technology to improve engineering documentation and data control. Two identified improvement areas, labor intensive documentation research and outdated drafting standards, were targeted as top priority.

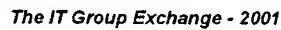
MSS selected AutoManager® WorkFlow from Cyco software to manage engineering documentation. Existing databases were imported into AutoManager®, documentation was indexed to databases and the system deployed throughout the site. The software is currently installed on over 150 desktops, of which 55 are in the MSS Engineering and Construction Department and the remainder are customer desktops (NASA, Lockheed, Boeing, etc.)

The outdated SSC drafting standard was written for pre-CADD drafting methods, in other words, board drafting. In updating this document, MSS incorporated technology by utilizing hyperlinks to reference CADD drawings. The Table of Contents, the List of Figures and references in the text body all contain hyperlinks. This document is available to the Stennis community over the Stennis Intranet. Additionally, the document and all reference drawings are available on CD for use by outside firms providing A&E services to NASA.

Implementation of COTS software solutions to manage engineering documentation and update the drafting standard resulted in significant increases in productivity by reducing the time spent searching for documents.

PM Program Abstract

1. **Introduction: MSS evaluation of existing PM program and plans to migrate to new contract requirements.**
 - A. Determine difference between MI and MTS requirements.
 - B. Determine accuracy of equipment database.
 - C. Identify equipment inadvertently left out of the contract.
 - D. Closely interface with customer to clarify ambiguous contract requirements.
 - E. Establish partnering rapport with customer.
 - F. Determine schedule for new MAXIMO 4.03 installation.
2. **Time lines.**
 - A. Contract start (8/29/99).
 - B. Attempts at MAXIMO 4.03 installation.
3. **Problems at start up.**
 - A. Labor issues
 - B. Cultural issues
 - C. NASA partnering
 - D. Exposing MTS to meaningful sanity checks and effecting changes.
 - E. Convincing MSS incumbent technical staff to abandon MIs in favor of MTS.
 - F. Developing meaningful labor reports establishing PM program progress relative to contract requirements.
 - G. Establishing reachable short-term goals to keep the staff motivated without losing sight of the seemingly impossible long-term goals.
 - H. How to educate the work force on current contract requirements, MSS policies and philosophies, and the technical complexities of MAXIMO 4.03.
4. **Problem solutions:**
 - A. Agreement with union to temporarily remove work from Work Control until processes developed.
 - B. Weekly meetings with shop leads to develop dialog.
 - C. Many partnering sessions with NASA eventually gained their confidence in our abilities and also mitigated many technical issues.
 - D. Many MTS were added, deleted, and otherwise modified as a result of partnering with NASA to allow successful transition into meaningful preventive maintenance activities.
 - E. Incumbent technical staff was slowly transitioned into the new way of doing business.
 - F. Active CMMS management
5. **Current Status**



Business Systems Integration
Stennis Space Center
Craig Bramley
Presented by: Craig Bramley

The IT Group Exchange - 2001
Philadelphia, Pennsylvania
 March 29 - 31, 2001



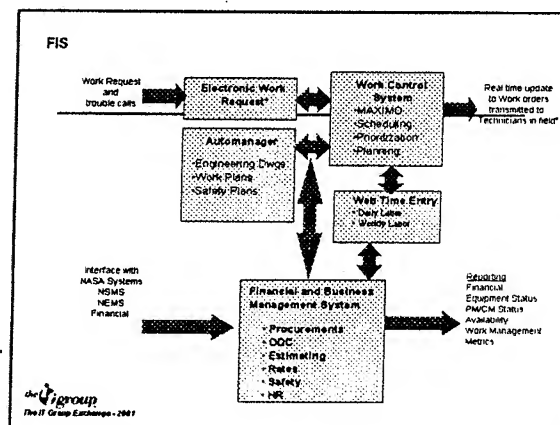
Systems Integration at SSC

- Work Control
- Computerized Maintenance Management
- Project Metrics
- Project Accounting
- Web Based Time Keeping
- Purchasing
- Engineering Drawings
- Human Resources



Introduction

- 10,000 equipment/system items managed in database
- 2 million square feet of floor space maintained
- 170 Facilities
- 14,000 Acre work site
- 9,000 Preventive Maintenance tasks performed annually
- Process over 40,000 Purchases annually
- Process and manage over 30,000 work orders annually
- System provides control and status to NASA and 30 Resident Agencies



Financial Management

- Government Off the Shelf (GOTS) Package customized for Stennis Space Center
- Oracle Based (Currently version 8I)
- Payroll, Accounting, HR, and Purchasing are contained in system
- Data Warehouse functionality established between:
 - Computerized Maintenance Management System (CMMS)
 - Web Based Timekeeping
 - NASA Supply System and
 - NASA Financial Systems



FOS Information System (FIS)

- Customers provided read-only access to query select Financial and CMMS elements of FIS
- Data in FIS refreshed regularly for reports and queries
- Customers have access to same reports as MSS personnel
- Have developed Internal Web Pages for reports and status of common reporting items (e.g. PM and CM performance, work schedules)

Work Control

Work Center	Job	Start Date	End Date	Status	Priority	Assignee	Comments
101	101-101-101	10/10/00	10/10/00	Completed	High	J. Smith	
102	102-102-102	10/10/00	10/10/00	In Progress	Medium	M. Jones	
103	103-103-103	10/10/00	10/10/00	Pending	Low	K. Brown	
104	104-104-104	10/10/00	10/10/00	On Hold	Low	L. Green	
105	105-105-105	10/10/00	10/10/00	Completed	High	P. White	

On Line Reports

Report Category	Report Name	Description
Financial	Monthly Financial Summary	Summary of monthly financial performance.
Operational	Production Efficiency Report	Report on production efficiency and downtime.
Maintenance	Equipment Maintenance Schedule	Schedule for equipment maintenance activities.
Human Resources	Employee Performance Review	Review of employee performance and productivity.

Accounts Payable Status

Vendor	Invoice #	Invoice Date	Due Date	Amount	Status
ABC Corp	101-101-101	10/10/00	10/10/00	\$10,000	Paid
DEF Inc	102-102-102	10/10/00	10/10/00	\$20,000	Outstanding
GHI Ltd	103-103-103	10/10/00	10/10/00	\$15,000	Outstanding
JKL Co	104-104-104	10/10/00	10/10/00	\$5,000	Outstanding
MNO Corp	105-105-105	10/10/00	10/10/00	\$30,000	Outstanding

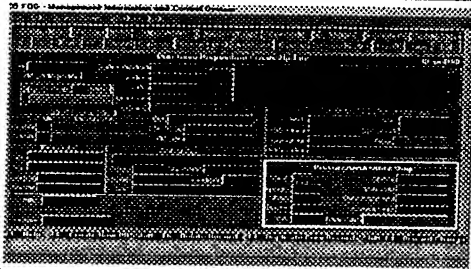
Reports

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Maintenance	Equipment Maintenance Schedule	Schedule for equipment maintenance activities.
Human Resources	Employee Performance Review	Review of employee performance and productivity.

Purchase Order Analysis

Vendor	PO #	PO Date	PO Amount	PO Status
ABC Corp	101-101-101	10/10/00	\$10,000	Open
DEF Inc	102-102-102	10/10/00	\$20,000	Open
GHI Ltd	103-103-103	10/10/00	\$15,000	Open
JKL Co	104-104-104	10/10/00	\$5,000	Open
MNO Corp	105-105-105	10/10/00	\$30,000	Open

Purchase Requisition



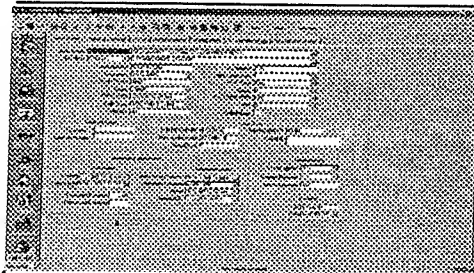
Work Control and CMMS

- Operate MAXIMO version 4.03
- All work requests and maintenance activities are processed through Work Control system
- Work Order Information in CMMS updated in Web based Time Keeping System every 15 minutes
- Actual labor information (time and material) updated daily in CMMS and validated weekly
- Enhancements made to functionality of MAXIMO to support our contractual requirements

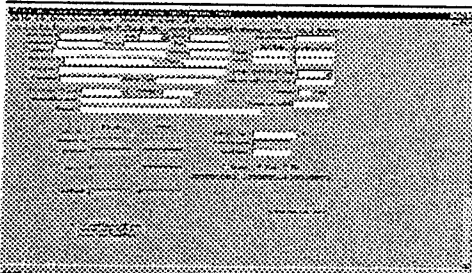
Work Control and CMMS

- Screens added for our Multimedia, Engineering and Fluid Component Processing Operations to support their specific requirements.
- Through our Data Warehouse, information is fed into our central reporting and financial systems
- CMMS functionality augmented by numerous reports developed in Crystal Reports
- E-mail notification of funding status (85% and 100%)

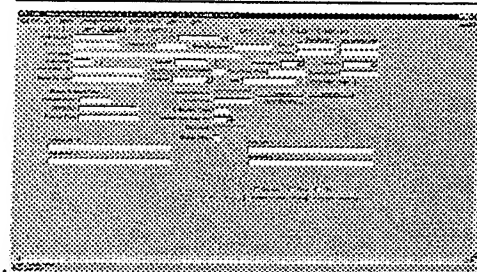
Engineering



Multimedia Services



Fluid Component Processing



Work Order Entry

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Actuals

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Work Order Cost Tracking

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Equipment

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Preventive Maintenance

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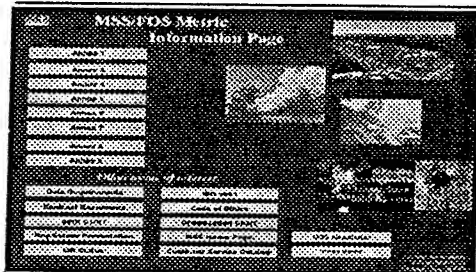
Performance Metrics

- Over 90 measures of performance
- Updated Monthly based on self reporting and customer input
- Many metrics are derived from FOS Information System data (cost, schedule, performance)
- Metrics are hosted on internal server and are available to customer for review

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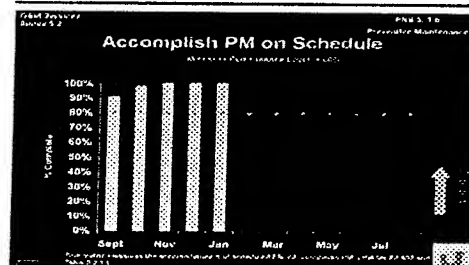
Metrics Home Page



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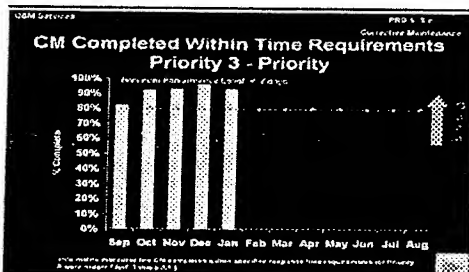
Metrics (Preventive Maintenance)



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Metric (Corrective Maintenance)



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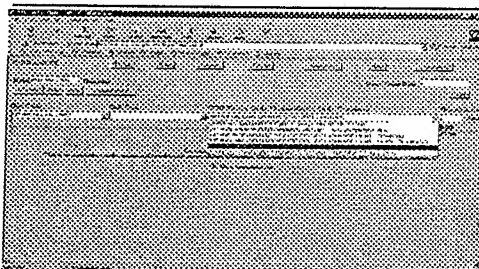
Web Based Timekeeping

- Only approved work orders appear
- Refreshed every 15 minutes
- Work orders assigned by crew
- Pay differentials in system
- Locked out from change at weeks end
- Entry Password protected
- Daily timecard exception reports

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Web Based Timesheet



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Conclusion

- Significant improvements in visibility and management control
- Improved processes
- Increased information for employees
- Customer visibility increased
- Improved performance

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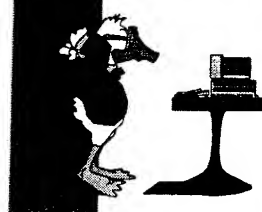
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Control

March 30, 2001

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- Can't be fixed
 - By 1993, NASA and the contractor had given up
- Fix it or get rid of it
 - Deputy Center Director

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Background and History
Problem
Root Cause
Making Documentation Important
Documentation Today
Solutions
Reviving Documentation
Demonstration

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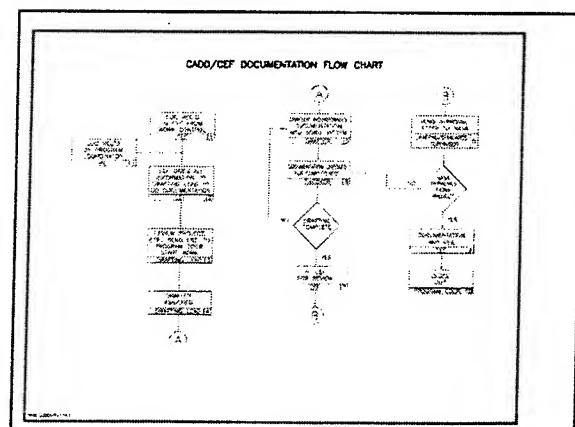
Important



- Making it happen
 - Documentation given highest priority
 - All stake holders informed
 - Developed Flow chart and Work Instruction
 - Set up tracking system

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Drafters preferred "real work"
Drafters worked design projects and called on documentation assignments
Documentation Backlog Grows
As backlog grows, motivation declines
Backlog reaches a high of 30 m-yrs
More drafters are hired (25 total)



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- **Implementing Technology**
 - AutoManager reduces document retrieval time to less than 30 minutes
 - Drafting Standard linked to AutoCADD drawings

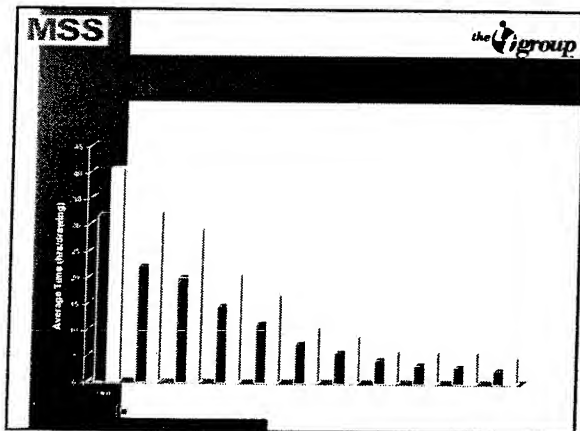
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Documentation Tracking

An estimate is prepared for every job
Track actual hours expended
Review data with CADD drafters
Press button to view tracking system
Results

Average Document update time is
Dramatically reduced

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